

We claim:

- 5 1. A process for producing biotin wherein an S-adenosylmethionine synthase gene, having the sequence SEQ ID No. 1, and at least one further biotin biosynthesis gene bioS1, bioS2 or bioS3, having the sequences SEQ ID No. 3, SEQ ID No. 5 or SEQ ID No. 7, and also their functional variants, analogues or derivatives, are expressed in a prokaryotic or eukaryotic host organism which is able to synthesize biotin, this organism is cultured and the synthesized biotin is used directly after separating off the biomass or after purifying the biotin.
- 15 2. A process as claimed in claim 1, wherein the variants of the genes having the sequences SEQ ID No.1, SEQ ID No. 3, SEQ ID No. 5 and SEQ ID No. 7 are genes which, on the amino acid level deduced from the sequences as claimed in claim 1, exhibit a homology of from 30 to 100% and enable an increased synthesis of biotin to be achieved.
- 20 3. A process as claimed in claim 1 ~~or 2~~, wherein an organism selected from the group of the genera Escherichia, Citrobacter, Serratia, Klebsiella, Salmonella, Pseudomonas, Comamonas, Acinetobacter, Azotobacter, Chromobacterium, Bacillus, Clostridium, Arthrobacter, Corynebacterium, Brevibacterium, Lactococcus, Lactobacillus, Streptomyces, Rhizobium, Agrobacterium, Staphylococcus, Rhodotorula, Sporobolomyces, Yarrowia, Schizosaccharomyces or Saccharomyces is used as the host organism.
- 25 4. A process as claimed in <sup>Claim 1</sup> ~~any of claims 1 to 3~~, wherein a regulation-defective biotin mutant is used as the host organism.
- 35 5. A process as claimed in <sup>Claim 1</sup> ~~any of claims 1 to 4~~, wherein at least one copy of the genes having the sequences SEQ ID No.1, SEQ ID No. 3, SEQ ID No. 5 and SEQ ID No. 7 as claimed in claim 1 is expressed in a prokaryotic or eukaryotic host organism either alone or together with one or more copies of at least one further biotin gene selected from the group bioA, bioB, bioF, bioC, bioD, bioH, bioP, bioW, bioX, bioY or bioR.
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<sup>17</sup>  
~~Claim 1~~  
 a 6. A process as claimed in ~~any of claims 1 to 5~~, wherein at least one copy of the genes having the sequences SEQ ID No. 1, SEQ ID No. 3, SEQ ID No. 5 and SEQ ID No. 7 as claimed in claim 1 is expressed in a prokaryotic or eukaryotic host organism either alone or, on a shared vector or on separate vectors, together with one or more copies at least one further biotin gene selected from the group bioA, bioB, bioF, bioC, bioD, bioH, bioP, bioW, bioX, bioY or bioR.

10 7. A gene construct which comprises an S-adenosylmethionine synthase gene, having the sequence SEQ ID No. 1, and at least one further biotin biosynthesis gene bioS1, bioS2 or bioS3, having the sequences SEQ ID No. 3, SEQ ID No. 5 and SEQ ID No. 7, and also their functional variants, analogues or derivatives, and which is functionally linked to one or more regulatory signals for the purpose of increasing gene expression and/or protein expression and/or whose natural regulation has been switched off.

20 8. A gene construct as claimed in claim 7, which has been inserted into a vector which is suitable for expressing the gene in a prokaryotic or eukaryotic host organism.

a 25 9. A gene construct as claimed in claim 7 ~~or 8~~, wherein the genes having the sequences SEQ ID No. 1, SEQ ID No. 3, SEQ ID No. 5 and SEQ ID No. 7, and also their functional variants, analogues or derivatives, are present in several copies in the gene construct.

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 a 10. A gene construct as claimed in ~~any of claims 7 to 9~~ <sup>Claim 7</sup>, wherein the S-adenosylmethionine synthase gene, SEQ ID No. 1, and at least one further biotin biosynthesis gene bioS1, bioS2 or bioS3, having the sequences SEQ ID No. 3, SEQ ID No. 5 and SEQ ID No. 7, and also their functional variants, analogues or derivatives, as claimed in claim 7, are present in the gene construct or vector together with one or more copies of at least one further gene selected from the group bioA, bioB, bioF, bioC, bioD, bioH, bioP, bioW, bioX, bioY or bioR.

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 11. An organism which comprises a gene construct as claimed in ~~any of claims 7 to 10.~~ <sup>Claim 7</sup>

a 45 12. The use of the sequences as claimed in claim 1 for producing biotin.

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13. The use of the bioS3 gene, having the sequence SEQ ID No. 7, or of its functional variants, analogues or derivatives, either alone or in combination with at least one further gene selected from the group S-adenosylmethionine synthase gene, bioS1, bioS2, bioA, bioB, bioF, bioC, bioD, bioH, bioP, bioW, bioX, bioY or bioR, for producing biotin.

*a* 14. The use of a gene construct as claimed in <sup>claim 7</sup> ~~any of claims 7 to 10~~ for producing biotin.

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